

nerved and slightly hairy, short beaked, thin in texture, empty, twice longer than the white-hyaline scale.—Revere, near Boston, Mass. C. E. Faxon. (Fig. B.)

CAREX GRACILLIMA  $\times$  PUBESCENS Bailey, l. c. 107.

*C. Sullivantii* Boott, Sill. Journ. xlii. 29.

CAREX STRICTA  $\times$  SALINA Bailey, l. c. 85.

*C. spiculosa*? W. Boott, Bot. Gaz. ix. 88.

"*Forma sterilis salinæ*" Christ, Cat. Car. Eur. 7.

CAREX TENTACULATA  $\times$  LURIDA Bailey, l. c. 69.

*C. tentaculata*, var.? *altior* Boott, Ill. 94.

CAREX BULLATA  $\times$  UTRICULATA Bailey, l. c. 68.

*C. Olneyi* Boott, Ill. 15, t. 42.

EXPLANATION OF PLATE XI.—A, *Carex arctata*  $\times$  *flexilis*,  $\times \frac{1}{2}$ ; a, perigynium; a', scale of same,  $\times 7$ .

B, *Carex gracillima*  $\times$  *virescens*,  $\times \frac{1}{2}$ ; b, perigynium; b', scale of same,  $\times 7$ .

## The Flora of our Southwestern Archipelago. II.<sup>1</sup>

WM. S. LYON.

The absence of the great genus *Astragalus* from Guadalupe struck Mr. Watson as somewhat remarkable.<sup>2</sup> It seems to the writer, however, phenomenal that the genus should have any representation not only upon that island, but upon any of those under our consideration.

The "Rattleweeds" take as kindly as does the horned toad to the dry, arid basins of the interior, and of the vast number known but few are reported from the immediate sea-board. Only four species I know of approach anywhere near the coast-line adjacent to the Santa Barbara group.<sup>3</sup> The papery texture of the pods of most species unfits them for transportation by water, while the pernicious nature of some species makes them avoided by animals, and an inherent antipathy to the moisture-laden atmosphere of the seas keeps them mainly retired from the coast. Nevertheless three species manage to reach Catalina, two get to Cedros, one to Clemente, and the genus does not fail altogether till far out at sea on Guadalupe.

<sup>1</sup>Continued from page 205.

<sup>2</sup>Proc. Am. Acad. l. c. p. iii.

<sup>3</sup>*A. leucopsis*, *A. Antiselli*, *A. didymocarpus*, *A. pycnostachyus*.

Of the three species reaching Catalina, two are common to the immediate coast, and their migration is less a matter of wonderment than the development of an entirely new and interesting species (*A. Nevinii*) upon Clemente, which can only be accounted for by assuming that the potency of insular influences in the elaboration of new types have succeeded in overcoming what I believe to be the natural antagonism of the genus to the tide line.<sup>4</sup>

Localization of species is the next feature which arrests our attention. *Hemizonia Streetsii* is not infrequent on the east end of Catalina, extending quite down to (and there in greater abundance than elsewhere) the narrow isthmus which connects the east and west sections of the island. A strong current of wind at nearly all times sucks through this narrow causeway, across which one might almost throw a stone; otherwise all conditions of soil and climate seem identical on both sides. Diligent search during two seasons failed to reward me with a sight of this species from the west end. The current of wind seems insufficient to account for this peculiarity, as all other species pass and repass freely. Paucity of species is worthy of mention, more striking in Catalina than in Clemente or Guadalupe, since the former island possesses in an eminent degree all the physical requirements of a large and varied flora: great size, low fertile valleys, swamp lands, river bottoms (in miniature), rolling hills, sub-alpine elevations, densely wooded and naked exposures, and is not even wanting on the south side our so-called "desert" country. Excepting only the region of perpetual snow in the upper Sierras, the whole of southern California, with upwards of 2,000 species, presents no greater variety of physical conditions than exist here, yet only a total of 153 species are reported from this island. Collections from Guadalupe and Clemente having been made only in the spring, will probably be augmented by future exploration, yet those so far reported are meager in the extreme.

A summary of Mr. Greene's list, and that subjoined, shows a total of only 287 Phanerogams and ferns from these three islands. Of these, 46, or 16 per cent. of the whole number, are strictly insular. Of the 287, 23, or 8 per cent., are limited to Guadalupe; 10, or about 3½ per cent., restricted to Catalina; and 5, or about 1¾ per cent., peculiar to Clemente. The 23 Guadalupe species constitute 17 per cent. of the whole 133 species reported from that island. The 10 Catalina species form 6½ per cent of the 153 species listed from thence; and the 5 from Clemente are about 6

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<sup>4</sup>This peculiarity has been noted of the genus *Astragalus* more strongly than of any other of the great genera characteristic of California flora; among which may be cited *Hosackia*, *Lupinus*, *Krynitzkia*, *Mimulus* and *Eriogonum*, all of which are abundantly represented in closest proximity to the sea shore.

per cent. of the 81 species collected on that island. Lastly, 31, or 38 per cent. of the whole flora of Clemente is reported also from Guadalupe; and 35, or only 23 per cent., of that of Catalina is common to itself and Guadalupe. More significance attaches to this latter analysis than to the others, as it seems to indicate a closer relationship between the floras of Clemente and the distant Guadalupe than obtains on the two nearer islands.<sup>5</sup>

At this point it is proper to refer back to the statement made in relation to the antiquity of Clemente, that the geology and present flora of that island were not in apparent harmony. This hypothesis, determined by the scantiness of peculiar species, is far from conclusive. Greater antiquity would afford opportunity for the extension landward of many perhaps original species whose local identification would thus be absorbed and lost forever; and if the faintest value be attached to the common methods of seed dispersal, facilities have occurred for the distribution of a score of distinctive floras; and while strongly disparaging those very methods in general, their specific force and application is readily conceded where the barrier to isolation becomes contemptible, in view of the stupendous lapses of time since the seas first swept the uppermost terraces of Clemente.

From all the foregoing we briefly suggest:

1st. Present variation and constant modifications in matter of size point to the mutability of species upon these islands.

2d. The large percentage (16) of the whole flora being characteristic, tends strongly to indicate insular genesis.

3d. That there are no barriers which some species can not overcome; while the close restriction of others to local habitats and seeming to enjoy greater facilities for expansion than the first named, would indicate that the latter species were too short-lived to acquire the adaptability and availability for extension possessed by the former.

4th. That the material available for investigation is of too conflicting a nature to formulate even a scientific "guess" as to primitive origin of the floras of these islands.

The discovery of a new genus on Catalina and Santa Cruz<sup>6</sup>, whose definite characters and relationship is not yet wholly settled, but whose nearest apparent affiliation is native of northern Mexico, might lead us to inquire for some such derivation; but Mr. Watson has shown how unlikely is this to be the case with

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<sup>5</sup> Since making the above analysis, the publication of some new species and extension of the limits of others by Dr. Gray in his recent revised supplement to the *Syn. Flora of N. America* affects the exactitude of the enumerations given, but not enough to vitiate the general conclusions.

<sup>6</sup> *Proc. Am. Acad.*, vol. 20.

Guadalupe, hence with our northern group. From the presence of a few sporadic South American forms it would be as unsatisfactory to attempt in any way to connect their floras as to deduce anything European from the presence of *Lavatera*.

Have these islands ever formed part of a continuous territory? Have they ever been united to the adjacent continent? Is their antiquity greater or less than that of the main land?

These, and a host of correlated questions, must first be answered authoritatively by the geologist who undertakes their careful exploration; until then the botanist must relegate the history of the past to the field of idle speculation, and from the pregnant material at hand confine himself to defining the present—anticipating the future.

LIST OF FLOWERING PLANTS AND FERNS OF SANTA CATALINA ISLAND.

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| 1. <i>Clematis ligusticifolia</i> Nutt.  | 36. <i>Rubus ursinus</i> Cham. & Schlecht.                            |
| 2. <i>Eschscholtzia peninsularis</i> Greene                                    | 37. <i>Cercocarpus parvifolius</i> Nutt.                              |
| 3. <i>Crossosoma Californicum</i> Nutt.  | 38. <i>Adenostoma fasciculatum</i> Hook. & Arn.                       |
| 4. <i>Dendromecon rigidum</i> Benth.   | 39. <i>Alchemilla arvensis</i> Scopoli.                               |
| 5. <i>Isomeris arborea</i> Nutt.   | 40. <i>Rosa Californica</i> Cham. & Schlecht.                         |
| 6. <i>Capsella Bursa-pastoris</i> Mœench.                                      | 41. <i>Heteromeles arbutifolia</i> Roem.                              |
| 7. <i>Oligomeris subulata</i> Boiss.   | 42. <i>Lyonothamnus floribundus</i> Gray.                             |
| 8. <i>Helianthemum scoparium</i> Nutt.   | 43. <i>Ribes viburnifolia</i> Gray.                                   |
| 9. <i>Frankenia grandifolia</i> C. & S.  | 44. <i>Tillæa minima</i> Miers.                                       |
| 10. <i>Silene Gallica</i> Linn.  | 45. <i>Cotyledon cæspitosa</i> Haworth.                               |
| 11. <i>Stellaria media</i> Linn.   | 46. <i>Zauschneria Californica</i> Presl.                             |
| 12. <i>Lepigonum macrothecum</i> F. & M.                                       | 47. <i>Oenothera micrantha</i> Hornem.                                |
| 13. <i>Sagina occidentalis</i> Wats.   | 48. <i>Oenothera bistorta</i> Nutt.                                   |
| 14. <i>Malvastrum Thurberi</i> Gray.   | 49. <i>Godetia tenella</i> Wats.                                      |
| 15. <i>Erodium cicutarium</i> L'Her.   | 50. <i>Megarrhiza Californica</i> Torr.                               |
| † 16. <i>Rhamnus crocea</i> Nutt.  | 51. <i>Megarrhiza Marah</i> , reported by Baker, not collected since. |
| * 17. <i>Ceanothus sorediatus</i> H. & A.                                      | 52. <i>Opuntia Engelmanni</i> Salm.                                   |
| 18. <i>Rhus diversiloba</i> Hook. & Arn.                                       | 53. <i>Mesembryanthemum crystallinum</i> Linn.                        |
| 19. <i>Rhus ovata</i> Wats.  | 54. <i>Caucalis microcarpa</i> Hook & Arn                             |
| 20. <i>Rhus integrifolia</i> Benth. & Hook.                                    | 55. <i>Sambucus glauca</i> Nutt.                                      |
| 20 <sup>a</sup> . <i>Rhus integrifolia</i> (a remarkable ternate-leaved form). | 56. <i>Symphoricarpos mollis</i> Nutt.                                |
| 21. <i>Rhus laurina</i> Nutt.  | 57. <i>Lonicera hispidula</i> , var. <i>vacillans</i> Dougl.          |
| 22. <i>Trifolium microcephalum</i> Pursh.                                      | 58. <i>Galium angustifolium</i> Nutt.                                 |
| 23. <i>Melilotus parviflora</i> Desf.  | 59. <i>Galium Aparine</i> , var. <i>Vaillanti</i> Gray.               |
| 24. <i>Medicago denticulata</i> Willd.   | 60. <i>Galium Catalinense</i> Gray, <i>ined.</i>                      |
| 25. <i>Hosackia glabra</i> Torr.   | 61. <i>Brickellia Californica</i> Gray.                               |
| 26. <i>Hosackia micrantha</i> Nutt.  | 62. <i>Pentachæta Lyoni</i> Gray.                                     |
| 27. <i>Hosackia maritima</i> Nutt.   | 63. <i>Bigelovia veneta</i> Gray.                                     |
| 28. <i>Hosackia ornithopus</i> Greene.   | 64. <i>Erigeron foliosus</i> Nutt.                                    |
| 29. <i>Astragalus leucopsis</i> T. & G.  | 65. <i>Baccharis pilularis</i> DC.                                    |
| 30. <i>Astragalus trichopodus</i> Gray.  | 66. <i>Stylocline gnaphalioides</i> Nutt.                             |
| 31. <i>Astragalus Antiselli</i> Gray.  |   |
| 32. <i>Lathyrus vestitus</i> Nutt.   |   |
| 33. <i>Prunus occidentalis</i> Nutt.   |   |
| 34. <i>Prunus ilicifolia</i> Walp.   |   |
| 35. <i>Spiræa discolor</i> Pursh.  |   |

\* = *C. arborea*, Greene. Spec. v.

† Greene says for this island form, *C. maritima*, Kellogg.

67. *Filago Arizonica* Gray.  
 68. *Encelia Californica* Nutt.  
 69. *Leptosyne gigantea* Kellogg.  
 70. *Madia sativa* Molina.  
 71. *Madia filipes* Gray.  
 72. *Hemizonia Streetsii* Gray.  
 73. *Hemizonia fasciculata* T. & G.  
 74. *Layia platyglossa*, var. *brevisetata* Gray.  
 75. *Bæria Palmeri*, var. *Clementina* Gray.  
 76. *Amblyopappus pusillus* Hook & Arn.  
 77. *Achillea Millefolium* Linn.  
 78. *Cotula coronopifolia* Linn.  
 79. *Artemisia Californica* Less.  
 80. *Cnicus occidentalis* Gray.  
 81. *Centaurea Melitensis* Linn.  
 82. *Perezia microcephala* Gray.  
 83. *Stephanomeria paniculata* Nutt.  
 84. *Malacothrix saxatilis* T. & G.  
 85. *Arctostaphylos tomentosa*, Dougl.  
 86. *Arctostaphylos bicolor* Gray.  
 87. *Erythræa venusta* Gray.  
 88. *Gilia atractyloides* Steudel.  
 89. *Gilia multicaulis* Benth.  
 90. *Eucrypta (Ellisia) chrysanthemifolia* Greene.  
 91. *Phacelia hispida* Gray.  
 92. *Phacelia Lyoni* Gray.  
 93. *Emmenanthe penduliflora* Benth.  
 94. *Eriodictyon tomentosum* Benth.  
 95. *Heliotropium Curassavicum* Linn.  
 96. *Krynitzkia ambigua* Gray.  
 97. *Krynitzkia ramosissima* Gray.  
 98. *Plagiobothrys Arizonicus*, var. *Catalinense* Gray, *ined.*  
 99. *Convolvulus Soldanella* Linn.  
 100. *Convolvulus macrostegius* Greene  
 101. *Convolvulus Californicus* Choisy.  
 102. *Cressa Cretica* Linn.  
 103. *Solanum nigrum* Linn.  
 104. *Solanum Xanti*, var. *Wallacei* Gray.  
 105. *Lycium Californicum* Nutt.  
 106. *Scrophularia Californica* Cham.  
 107. *Pentstemon cordifolius* Benth.  
 108. *Antirrhinum Nuttalianum* Benth.  
 109. *Antirrhinum speciosum* Gray—coll. by Gambel.  
 110. *Mimulus glutinosus*, var. *puniceus* Wendl.  
 111. *Mimulus cardinalis* Dougl.  
 112. *Mimulus luteus* Linn.  
 113. *Mimulus floribundus* Dougl.  
 114. *Castilleia foliolosa* Hook. & Arn.  
 115. *Castilleia parviflora* Bong.  
 116. *Monardella lanceolata* Gray.  
 117. *Micromeria Douglasii* Benth.  
 118. *Audibertia Palmeri* Gray.  
 119. *Audibertia polystachya* Benth.  
 120. *Verbena prostrata* R. Br.  
 121. *Plantago Patagonica* Jacq.  
 122. *Mirabilis Californica* Gray.  
 123. *Rumex salicifolius* Weinmann.  
 124. *Eriogonum nudum*, var. *pauciflorum* Wats.  
 125. *Eriogonum giganteum* Wats.  
 126. *Chorizanthe staticoides* Benth.  
 127. *Pterostegia drymarioides* Fisch. & Meyer.  
 128. *Atriplex Coulteri* Dietrich.  
 129. *Urtica holosericea* Nutt.  
 130. *Urtica urens* Linn.  
 131. *Parietaria debilis* Forster.  
 132. *Eremocarpus setigerus* Benth.  
 133. *Salix lævigata* Bebb.  
 134. *Populus trichocarpa* T. & G.  
 135. *Quercus Douglasii* Hook. & Arn.  
 136. *Quercus dumosa* Nutt.  
 137. *Quercus tomentella* Engl.  
 138. *Calochortus Kennedyi* Porter.  
 139. *Calochortus Catalinæ* Wats.—coll. by P. Schumacher.  
 140. *Juncus bufonius* Linn.  
 141. *Stipa setigera* Presl.  
 142. *Avena fatua* Linn.  
 143. *Melica imperfecta* Trin.  
 144. *Hordeum marinum* Linn.  
 145. *Elymus condensatus* Presl.  
 146. *Gymnogramme triangularis* Kaulf.  
 147. *Gymnogramme triangularis*, var. *viscosa* Eaton.  
 148. *Pellæa ornithopus* Hook.  
 149. *Adiantum emarginatum* Hook.  
 150. *Aspidium aculeatum* Swartz.  
 151. *Selaginella rupestris* Spring.

## LIST OF FLOWERING PLANTS AND FERNS OF SAN CLEMENTE ISLAND.

1. *Eschscholtzia elegans*, var. *ramosa* Greene.  
 2. *Delphinium variegatum* Torr. & Gray.  
 3. *Meconopsis heterophylla* Benth.  
 4. *Sisymbrium reflexum* Nutt.  
 5. *Lepidium nitidum* Nutt.  
 6. *Oligomeris subulata* Boiss.  
 7. *Lepigonum macrothecum* Fisch. & Meyer.  
 8. *Claytonia perfoliata* Donn.  
 9. *Lavatera assurgentiflora* Kellogg.

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| <p>10. <i>Malva borealis</i> Wallman.<br/> 11. <i>Erodium cicutarium</i> L'Her.<br/> 12. <i>Erodium moschatum</i> L'Her.<br/> 13. <i>Rhus integrifolia</i> Benth. &amp; Hook.<br/> 14. <i>Rhus ovata</i> Watson.<br/> 15. <i>Lupinus affinis</i> Agardh.<br/> 16. <i>Trifolium microcephalum</i> Pursh.<br/> 17. <i>Trifolium Palmeri</i> Watson.<br/> 18. <i>Medicago denticulata</i> Willd.<br/> 19. <i>Hosackia ornithopus</i> Greene.<br/> 20. <i>Astragalus Nevinii</i> Gray, <i>ined.</i><br/> 21. <i>Vicia exigua</i> Nutt.<br/> 22. <i>Cotyledon</i>?<br/> 23. <i>Mentzelia gracilentia</i> T. &amp; G.<br/> 24. <i>Megarhiza Californica</i> Torr.<br/> 25. <i>Cereus Emoryi</i> Engl.<br/> 26. <i>Opuntia prolifera</i> Engl.<br/> 27. <i>Mesembryanthemum nodiflorum</i>.<br/> 28. <i>Mesembryanthemum crystallinum</i> Linn.<br/> 29. <i>Bowlesia lobata</i> Ruiz. &amp; Pavon.<br/> 30. <i>Sanicula bipinnatifida</i> Dougl.<br/> 31. <i>Daucus pusillus</i> Michx.<br/> 32. <i>Galium Aparine</i> Linn.<br/> 33. <i>Gnaphalium decurrens</i> Ives.<br/> 34. <i>Hemizonia Streetsii</i> Gray.<br/> 35. <i>Perityle Fitchii</i> Torr.<br/> 36. <i>Bæria Palmeri</i> Gray, var. <i>Clementina</i>.<br/> 37. <i>Eriophyllum Nevinii</i> Gray, <i>ined.</i><br/> 38. <i>Achillea Millefolium</i> Linn.<br/> 39. <i>Senecio Lyoni</i> Gray, <i>ined.</i><br/> 40. <i>Microseris Lindleyi</i> Gray, <i>ined.</i><br/> 41. <i>Malacothrix foliosa</i> Gray, <i>ined.</i><br/> 42. <i>Sonchus oleraceus</i> Linn.<br/> 43. <i>Gilia Nevinii</i> Gray, <i>ined.</i><br/> 44. <i>Gilia micrantha</i> Steudel.<br/> 45. <i>Nemophila racemosa</i> Nutt.<br/> 46. <i>Phacelia floribunda</i> Greene.<br/> 47. <i>Phacelia phyllomanica</i> Gray.<br/> 48. <i>Phacelia distans</i> Benth.</p> | <p>49. <i>Krynitzkia ambigua</i> Gray.<br/> 50. <i>Convolvulus macrostegius</i> Greene.<br/> 51. <i>Lycium Californicum</i> Nutt.<br/> 52. <i>Antirrhinum Nuttallianum</i> Benth.<br/> 53. <i>Antirrhinum speciosum</i> Gray.<br/> 54. <i>Collinsia bicolor</i> Benth.<br/> 55. <i>Plantago Patagonica</i> Jacq.<br/> 56. <i>Mirabilis Californica</i> Gray.<br/> 57. <i>Abronia umbellata</i> Lam.<br/> 58. <i>Rumex salicifolius</i> Wein.<br/> 59. <i>Eriogonum nudum</i>, var. <i>pauciflorum</i> Wats.<br/> 60. <i>Eriogonum</i> (n. sp.) unfit for determination.<br/> 61. <i>Pterostegia drymarioides</i> Fisch. &amp; Meyer.<br/> 62. <i>Aphanisma blitoides</i> Nutt.<br/> 63. <i>Chenopodium Californicum</i> Wats.<br/> 64. <i>Chenopodium album</i> Linn.<br/> 65. <i>Atriplex microcarpa</i> Dietrich.<br/> 66. <i>Atriplex leucophylla</i> Dietrich.<br/> 67. <i>Atriplex Californica</i> Moquin.<br/> 68. <i>Hesperocnide tenella</i> Torr.<br/> 69. <i>Parietaria debilis</i> Forster.<br/> 70. <i>Allium serratum</i> Watson.<br/> 71. <i>Brodiaea capitata</i> Benth.<br/> 72. <i>Phalaris Canariensis</i> Linn.<br/> 73. <i>Stipa setigera</i> Presl.<br/> 74. <i>Melica imperfecta</i> Trin.<br/> 75. <i>Ceratochloa grandiflora</i> Hook.<br/> 76. <i>Hordeum nodosum</i> Linn.<br/> 77. <i>Polypodium Californicum</i> Kaulf.<br/> 78. <i>Gymnogramme triangularis</i> Kaulf.<br/> 79. <i>Notholæna Newberryi</i> Eaton.<br/> 80. <i>Layia glandulosa</i> H. &amp; A.<br/> 81. <i>Amsinckia intermedia</i> Fisch. &amp; Meyer.</p> |
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ADDITIONAL NOTES.—In the very nature of things all islands, and these in a superlative degree, being largely exempted from the disturbing external influences affecting organic life upon the mainland, present to the naturalist an inviting field of exploration and research.

To the enthusiastic lover of the beautiful in nature, they offer as well a wealth of picturesque attractions. The southern coast of San Clemente once seen can never be forgotten. Against vertical cliffs of over two hundred feet the great seas dash with thunderous noise and appalling force, whilst far above, the rocky terraces, all softened with tender creamy lichens and whose darkling

caves each carry a drooping portière of lovely snow-white morning glories, forms in all a combination of rare grandeur and dainty prettiness seldom seen in one picture.

Catalina is a miniature world in itself. The landward coast is indented with little pockets rather than harbors, whose waters are marvels of tranquillity and pellucidity. From his boat the fisherman can look down and at a depth of fifty feet see the brilliant anemones and sea urchins starring the rocks below.

From the middle of the island two not inconsiderable streams (in California we call them rivers) take their source and flow in opposite directions, one through a sandy valley with here and there a fertile oasis of cottonwoods, anon a desert of prickly pear or tuñas within whose cruel environment lurks the dainty edible fruit of *Solanum Xanti*, var. *Wallacei*. The other "river" takes its way southerly through cañons of the loftiest mountains of the island until it plunges into Silver cañon; and thence to follow its precipitous course to the sea will try the nerves of the trained mountaineer. Down into the very bowels of the earth one seems to go, into ravines whose walls are vertical battlements of rock that not even a goat could scale, and into whose chilling and darkening depths the sun never looks; it is then that when a "break off" or falls occurs in the descent that the situation becomes interesting—critical, perhaps, for him who will not or can not retreat.

But Catalina is not all made up of dangerous cañons; its endless diversity constitutes its chiefest charm; teeming pastoral valleys where the track of the waterways fairly dazzle the eye with its splendor of *Mimulus cardinalis*, or enchanting nooks carpeted with gold fern or *Aspidium aculeatum*, else rolling hills or grim castellated mountains, constitute an aggregation of beauties and attractions to the traveler and explorer unequalled anywhere in Southern California.

Though I have spoken of my work upon these islands as "gleanings" the *harvest* on most of them as yet is virtually untouched, and offers a fruitful field to the zealous collector. If my remarks should stimulate any to their thorough and comprehensive exploration, my labor shall not have been in vain.